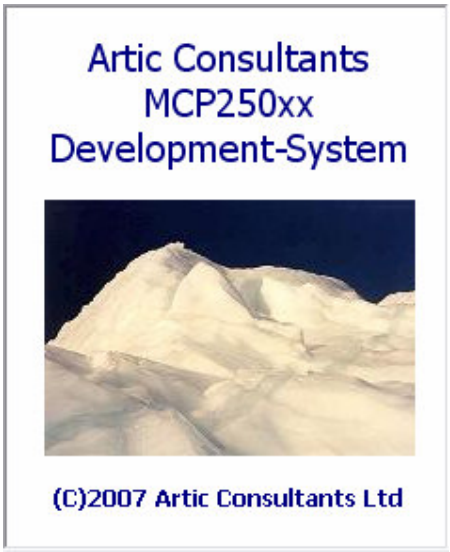
Artic Consultants Limited

MCP250xx Development System



User Manual

Version:	*Release:*
1.0	**General Release**

Project:	MCP250xx Development System
Date:	N/A
Time:	N/A
Location:	

Contents

Contents 2
Revision History 2
MCP250xx Dev-Sys Overview 3
- **Overview** 3
- **Installation** 3

MCP250xx Hardware 4
- **1.0 Hardware Overview** 4
- **1.1 Main Programmer Board Details** 4

MCP250xx Software 7
- **1.0 Software Overview** 7
- **2.0 Software Detail** 7

Programmer Operation 10
- **Overview** 10
- **Reading Target MCP250xx Configuration** 10

Configuration Operation 12
- **Overview** 12

Revision History

Issue	Date	Author	Comment
1	14/03/07	S. Allwood	First Issue

MCP250xx Dev-Sys Overview

Overview

The MPC250xx Development System allows a user to quickly and accurately configure and Program the Microchip MCP250xx CAN expanders.

Configuration & Programming is carried out in a simple GUI interface, where each aspect of the MCP250xx configuration is detailed.

The MCP250xx Development System will also read and write Microchips own *.dvs file format, which ensures full forward and backward capability with existing MCP250xx configuration files.

Installation

MCP250xx Development System will not operate without the USB driver software first being installed. Please install the software before continuing to use the MCP250xx Development System

Responsibilities of Operation of MCP250xx Hardware & Software

Connecting MCP250xx hardware to an existing CAN bus may cause errors and in-operation.

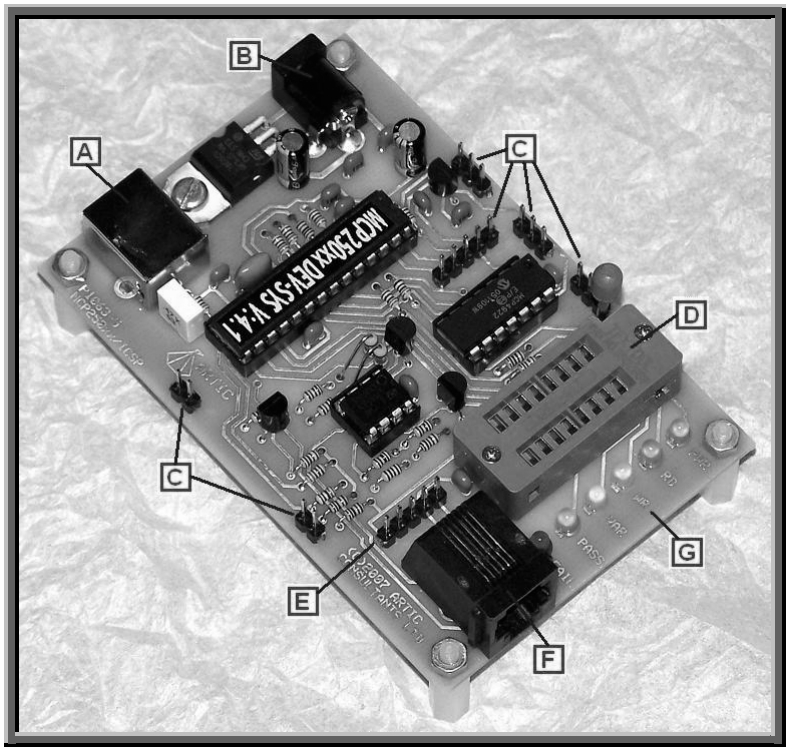
Serious Injuries and Damage to systems, other people, equipment and the user may result if the MCP250xx hardware is not operated in a responsible manor.

MCP250xx Hardware

1.0 Hardware Overview

This board contains the main control system and production quality programmer. This board has been designed to allow a number of “System Modules” to be connected and controlled via the main control system.

Main Programmer Board



1.1 Main Programmer Board Details

A: USB2.0 Connector:

This connects the MCP250xx hardware to the PC system running the MCP250xx Development System Software.

B: DC PSU Socket

This is the PSU socket. Connect the supplied PSU to this socket. Connecting any other PSU to this socket could result in damage to the MCP250xx development system hardware. The MCP250xx requires a PSU connection with the following specifications.

- +18v dc

- 250mA
- Centre Pin Positive

C: System Module connectors

These connectors (6) are reserved to allow suitable "System Modules" to be connected to the MCP250xx Development System hardware. No not connect anything to these connectors or damage to the MCP250xx hardware may result.

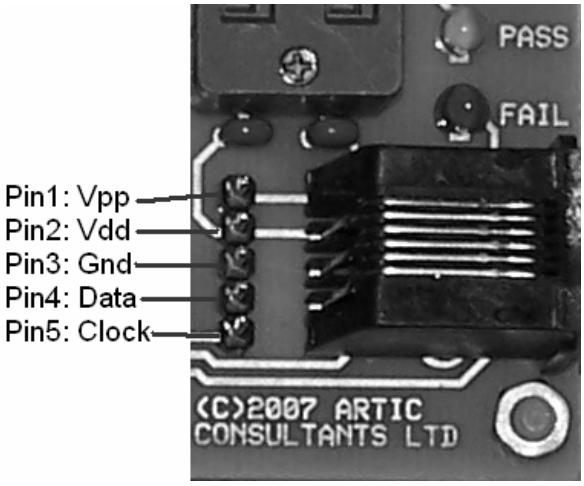
D: Programmer Zip Socket

This ZIF socket is provided to allow a quick connect/release of MCP250xx parts during a programming session.

E: MCP250xx ICSP Header

This simple pin header allows the programmer to be used in an ICSP mode, where a conventional ICSP connector cannot be used.

ICSP Pin Header Connections



F: RJ45 ICSP MCP250xx ICSP Socket.

This socket allows the programmer to be used in an ICSP mode. The use of the "industry standard" RJ45 connector makes this ICSP connection compatible with other ICSP programmers (ICD2, etc)

RJ45 Socket Pin Detail

- Pin1: Vpp
- Pin2: Vdd
- Pin3: Gnd
- Pin4: Data
- Pin5: Clock
- Pin6: N/C

G: Status Led's

These Led's allow the status of the Programmer to be understood. The Led's detail the following functionality;

PWR (Green): Indicates that the Main board is powered and is operating correctly. This LED will flash slowly (1Hz) in a problem with the programming voltage calibration has occurred.

RD (Green): Indicates when the programmer is "reading" information from the target MCP250xx part.

WR (Yellow): Indicates when the programmer is "writing" information to the target MCP250xx part. 2. Main Control Window

VAR (Yellow): Indicates when the programmer is verifying the programmed information is correctly programmer. The verify process uses a Vdd of 5.5v, 5.0v and 2.7v to ensure the information is correctly programmed into the MCP250xx.

PASS (Green): Indicates if the target MCP250xx part has been correctly programmed and verified correctly. This indicator will remain lit until a fresh program cycle is started.

FAIL (Red): Indicates that the target MCP250xx part failed to program and verify correctly. This indicator will remain lit until a fresh program cycle is started.

MCP250xx Software

1.0 Software Overview

The MCP250xx Application software provides a GUI environment to develop MCP250xx configurations.

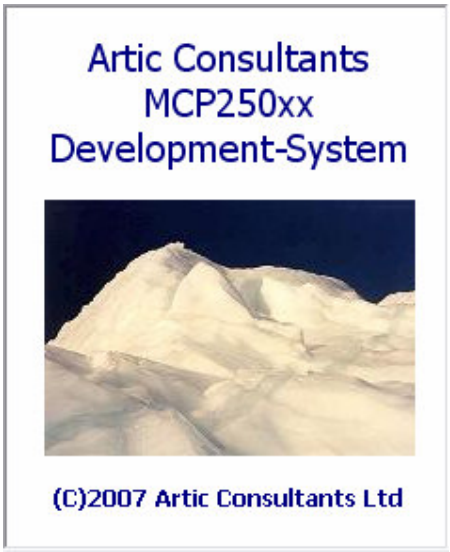
The software will read and write previously developed configuration files of Microchips own *.dvs format. This gives the Artic MCP250xx Development System full forward and backward compatibility.

The supplied software is designed to run on the following platforms. All supported platforms operate in a similar manor.

- Microsoft Windows® XP
- Mac OS X
- Linux OS

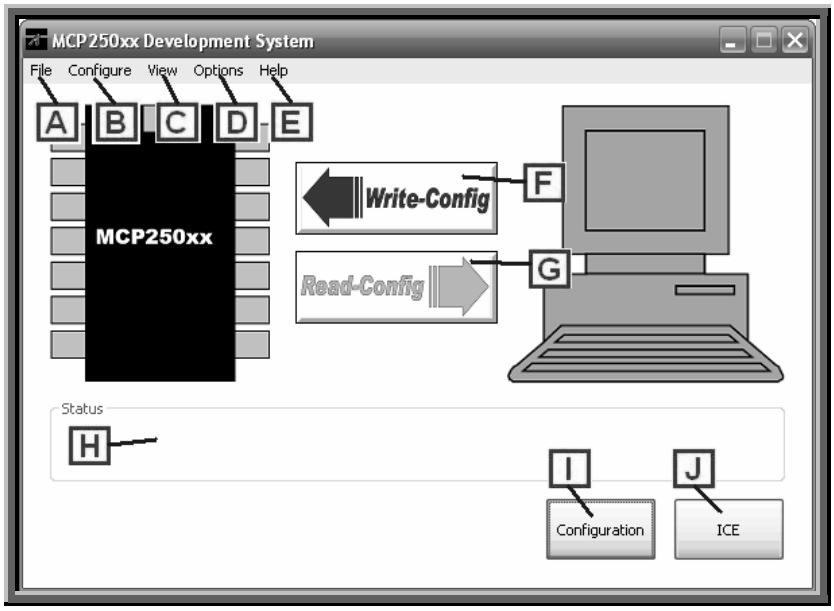
2.0 Software Detail

2.1 Application Start



This image will be shown for five seconds while the application is starting. Once the application has fully initialised the splash screen is removed and the Main Programmer Screen is displayed.

2.2 Main Programmer Screen



2.3 Main Programmer Feature Description

A: File Menu.
This menu allows the user the following options.
New: Creates a new default MCP250xx configuration. The MCP25020, MCP25025, MCP25050 & MCP25055 default parameters are supported.

- **Open:** Allows a user to reload a previously saved MCP250xx configuration file. Two file formats are supported

- **Save:** Allows a user to save the current MCP250xx configuration settings. Two file formats are supported

- **Save As:** Allows a user to save the current MCP250xx configuration settings. The user needs to supply a valid file name. Two file formats are supported

- **Default File Types:** This option allows the user to set the default file type. The Artic MCP250xx Development System supports two file types.
  - Type 1: Artic Development System (*.ads).
  - Type 2: Microchip Development System (*.dvs). This option is disabled if the Artic Development System hardware has not been detected.

- **Exit:** Causes the application to close.

B: Configure

Communications Port: This setting allows the user to select the communications port that will use to communicate with the MCP250xx Development System Hardware.

C: View

Config Registers: Shows the values of the configuration registers (in Hex and Binary formats)

I/O Visual: Shows the I/O settings of the MCP250xx

D: Options

Vdd & Vpp Calibration: Allows the user to calibrate the Vdd & Vpp values of the programmer hardware. The actual values are shown in the "About Screen…"

E: Help

Artic Consultants on the web: This item opens a web browser and navigates to the Artic Consultants Ltd web site

About MCP250xx Development System: This shows hardware & software version numbers, Programmer Calibration status and ICE Status.

F: Read Config

This button will cause a read from the target MCP250xx EPROM memory.

G: Write Config

This button will cause a write to the target MCP250xx EPROM memory.

H: Status

This area of the screen shows details of the current Development System operation

I: Configuration

This button opens the GUI MCP250xx configuration screen

J: ICE

This button opens the GUI In-Circuit-Emulator screen.

Programmer Operation

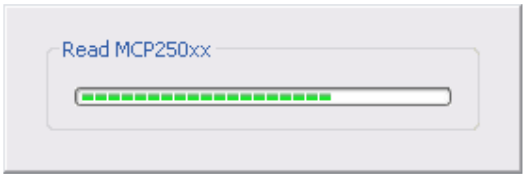
Overview

The programmer provides a way to read and write MCP250xx configuration files to the OTP memory of a target MCP250xx part.

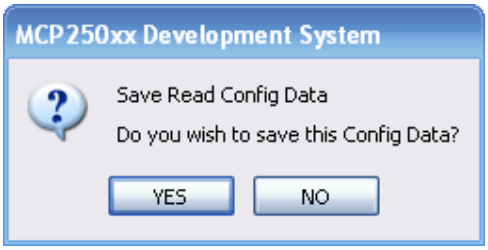
Production Quality Programmer
The programmer is a Production Quality programmer. Where the MCP250xx part is written using an accurate 5v applied to Vdd.

The target MCP250xx part is validated at the limits of valid Vdd operation (2.7v dc and 5.5v dc). This ensures that the configuration data is correctly programmed and the MCP250xx part can be used with all valid Vdd voltage settings.

Reading Target MCP250xx Configuration



This feature allows a pre-programmed MCP250xx configuration to be read from the device.

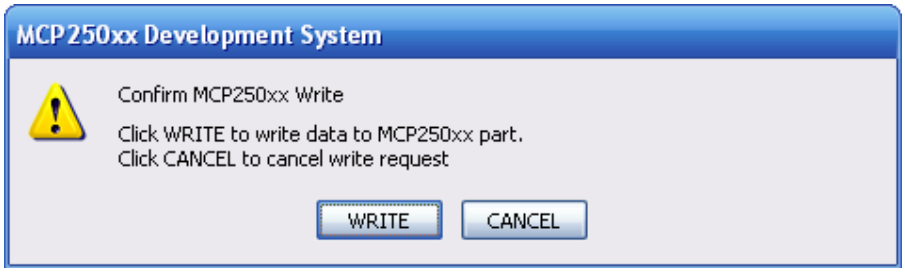


Once the configuration has been read, an option to save the configuration to file will be available. Also the Write Config option will be available.

Writing Target MCP250xx Configuration

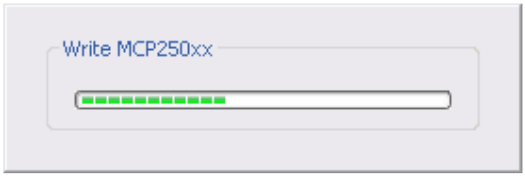
MCP250xx parts are OTP (one-time-programmable). So before writing data to the target MCP250xx, always ensure that the configuration you will be writing is correct – errors cannot be corrected after the write process has taken place.

This message will always be shown if a Write to target memory has been requested

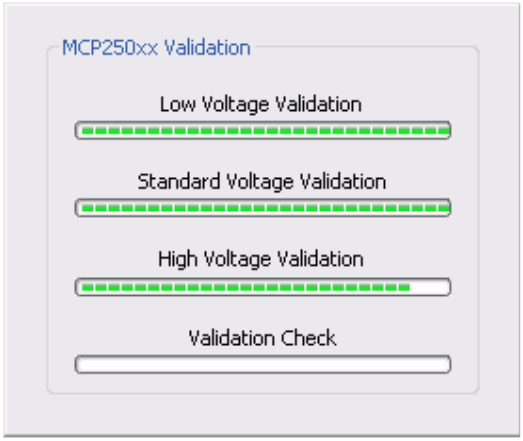


Clicking the CANCEL button will cancel the write request and return back to the programmer main screen

Clicking the WRITE button will start the write process to the target MCP250xx EPROM memory…



After the write process, the target MCP250xx EPROM memory is validated…



Configuration Operation

Overview

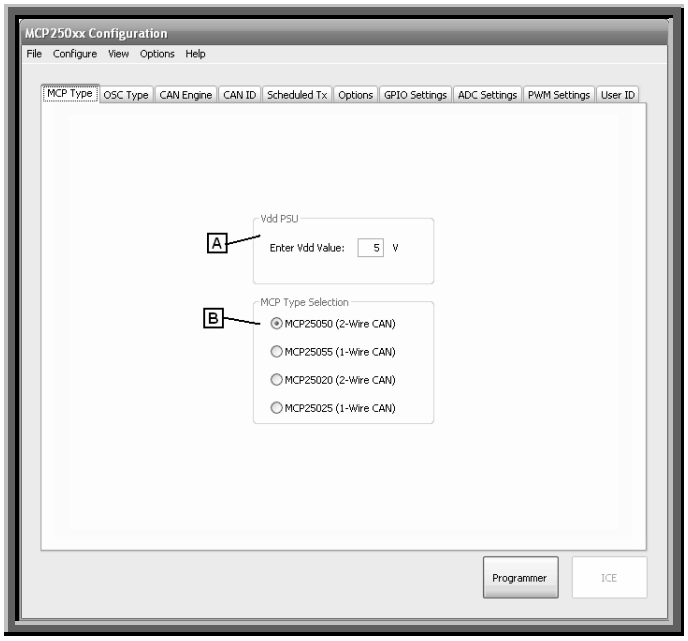
MCP250xx configuration is view easy to accomplish via the GUI Configuration screen. Each main area of MCP250xx configuration is split and grouped together into related areas

There are 10 main sections in the MCP250xx configuration page

- **MCP Type**
- **OSC Type**
- **CAN Engine**
- **CAN ID**
- **Scheduled TX**
- **Options**
- **GPIO Settings**
- **ADC Settings**
- **PWM Settings**
- **User ID**

MCP Type

This section allows the user to select the type of MCP250xx part that will use the configuration



A: Vdd PSU

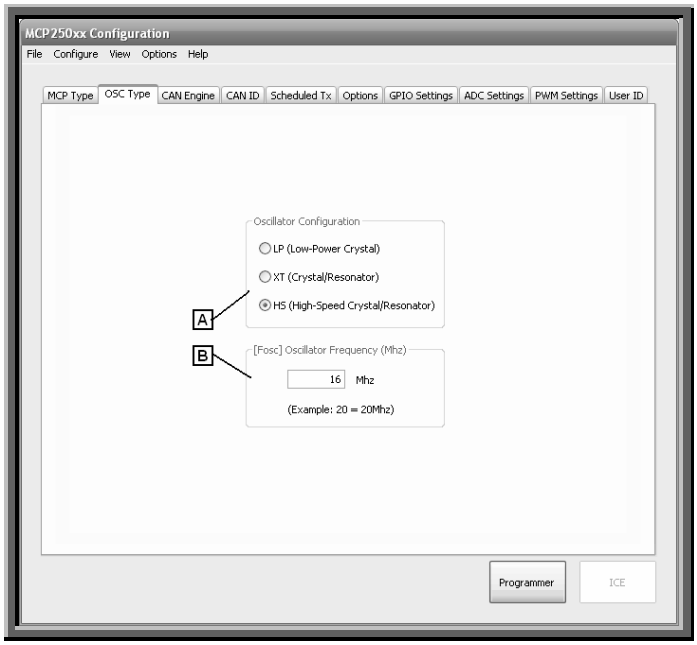
This section allows the user to enter the Vdd voltage that the MCP250xx part will use. This value allows the other configuration screens to calculate "real-world" values (e.g. threshold values, etc)

B: MCP Type Selection

This section selects the type of MCP250xx part that will use this configuration. Depending on the type of MCP250xx part selected, certain sections of the configuration screens will be disabled

OSC Type

This section allows the user to select the type of oscillator that will be used with the MCP250xx part and allows the user to detail the speed of the oscillator. This speed value will be other configuration sections to show "real-world" values and times that have been selected.



A: Oscillator Configuration

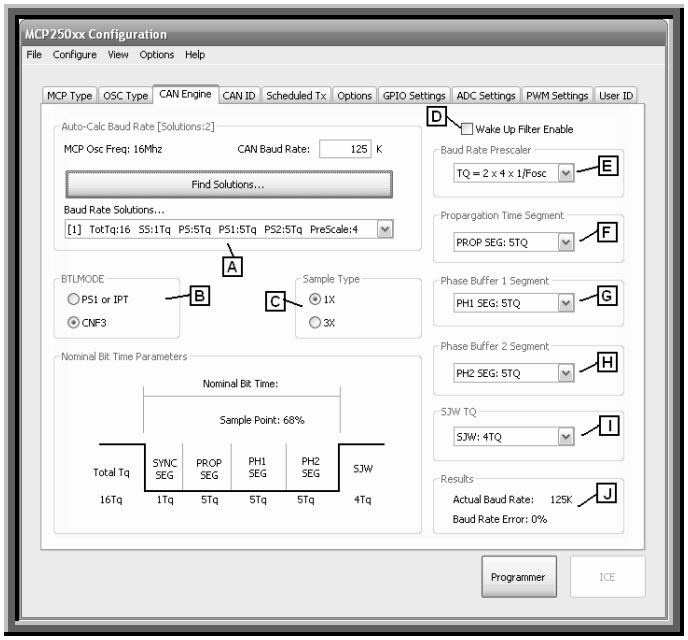
This section selects the type of crystal/resonator circuit that will be used with the MCP250xx part.

B: [Fosc] Oscillator Frequency

This section allows the user to enter the oscillator speed (in Mhz)

CAN Engine

This section allows the user to configure the CAN Engine. It features a Auto-Calc Baud rate generator so the "basic" required baud rate can be calculated very quickly. Other settings allow the user to change the baud rate, Tq settings, etc



A: Auto-Calc Baud Rate

This section allows the user to enter the required baud rate and auto-calculate the CAN engine settings needed. All the solutions are shown in a drop-down list, and allows the user to select the "best-fit" for the hardware/CAN bus application

B: BTLMODE

This section allows the user to have Phase Seg2 linked to Phase Seg1 or to be freely programmable

C: Sample Type

This setting selects the number of samples taken when reading the bus level.

D: Wake Up Filter Enable

This selects an additional filter to be applied to the Rx input of the CAN engine, and stops the MCP250xx waking up due to "noise".

E: Baud Rate Prescaler

This sets the BRP setting. A large value results in slower baud rates being generated

F: Propagation Time Segment

This sets the Tq used for the Propagation time. This setting should reflect the actual time taken by the signal to travel the length of the CAN bus media. (E.g. a short and lightly loaded CAN bus should use a small PropSeg value. While a long CAN bus should use a large PropSeg value)

G: Phase Buffer 1 Segment
This, together with Phase Buffer 2 Segment, sets the sample point used by the CAN engine.

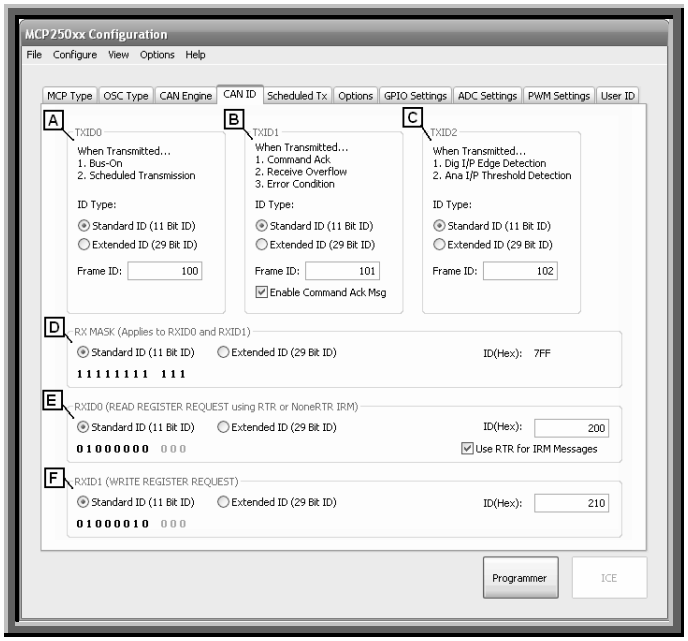
H: Phase Buffer 2 Segment
This, together with Phase Buffer 1 Segment, sets the sample point used by the CAN engine.

I: SJW TQ
This section sets the size of the "re-sync" window.

J: Results
This shows the current selected/calculated baud rate and the error % against the required baud rate.

CAN ID

This section allows the TX and Rx buffers to be defined, and how the MCP250xx part responds to CAN messages. Using actual ID's rather than setting SID & EID bytes means that the user can quickly set the ID's used by the MCP250xx without the need to resort to binary to hex conversions, etc.



A: TXID0

This sets the ID used for TX Buffer 0. This buffer is used to send "Bus-On" and scheduled transmissions. The user can select Standard or Extended Frame type and enter the ID used in HEX format.

B: TXID1

This sets the ID used for TX Buffer 1. This buffer is used to send "Command Ack", "Receive Overflow" and "Error Condition" transmissions. The user can select Standard or Extended Frame type and enter the ID used in HEX format.

C: TXID2

This sets the ID used for "Digital I/P edge detection" and "Analog input edge detection" transmissions. . The user can select Standard or Extended Frame type and enter the ID used in HEX format.

D: RX Mask

This setting allows the user to limit the scope of the MCP when receiving CAN frames. Usually this value should be set to all 1s to ensure the MCP only responds to the required RX0 and RX1 ID values

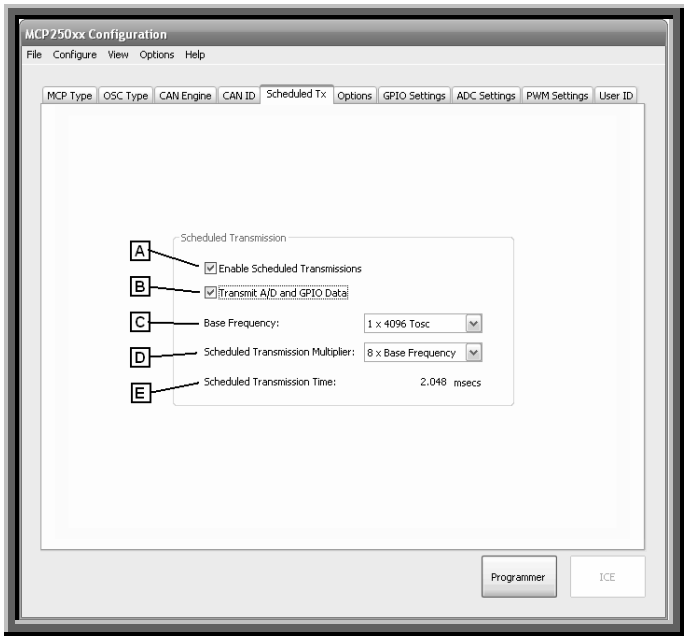
E: RXID0

This setting allows the user to set the base CAN ID that the MCP250xx will respond to, when data is requested from the MCP250xx. It also allows the user to select the type of messaging used for the IRM messages.

F: RXID1
This setting allows the user to set the base CAN ID that the MCP250xx will respond to, when data is written to the MCP250xx.

Scheduled TX

This section allows the user to set the type and speed of the scheduled TX from the MCP250xx part.



A: Enable Scheduled Transmissions

This enables or disables the scheduled transmission from the MCP250xx part

B: Transmit A/D and GPIO Data

This setting allows the A/D and GPIO data be to added or removed from the scheduled transmission.

C: Base Frequency

This setting selects the scheduled transmission “pre-scaler” timer value.

D: Scheduled Transmission Multiplier

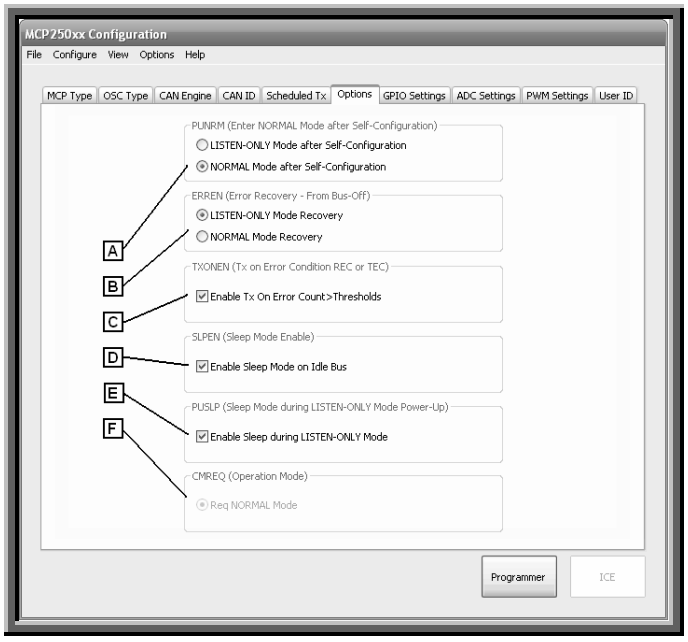
This setting selects the scheduled transmission “post-scaler” timer value.

E: Scheduled Transmission Time

This shows the calculated scheduled transmission period

Options

This section allows the user to configure the various options contained within the MCP250xx part. These options mainly deal with setting up the required interaction of the MCP250xx and the CAN bus.



A: PUNRM

This option sets the CAN engine operation mode that will immediately run following a successful self-configuration.

B: ERREN

This option sets how the MCP handles a “recovery from error” event

C: TXONEN

This option enables the “TX on Error Count > Threshold” CAN frame

D: SLPEN

This option sets how the MCP250xx part can enter sleep-mode

E: PUSLP

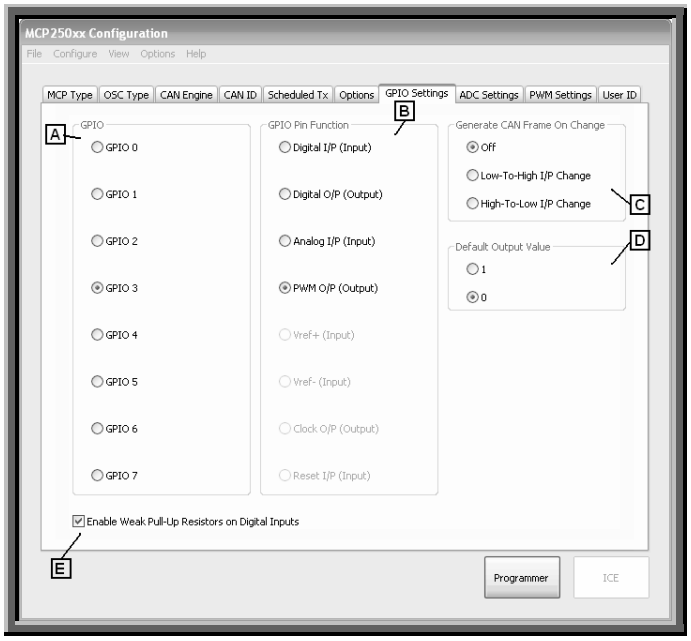
This option sets the operational mode of the CAN engine after a Wake-up event has occurred

F: CMREQ

This option must always be enabled during a self-configuration event.

GPIO Settings

This section sets up the I/O configuration that will be used by the MCP250xx part after a successful self-configuration



A: GPIO

This section allows the user to select the I/O pin that requires configuration

B: GPIO Pin Function

This section allows the user to select the type of I/O that will be used on this pin. Not all I/O pins has the same functionality

C: Generate CAN Frame On Change

This section allows the user to configure which I/O pins will crate a CAN frame on input status change or ADC threshold detected

D: Default Output Value

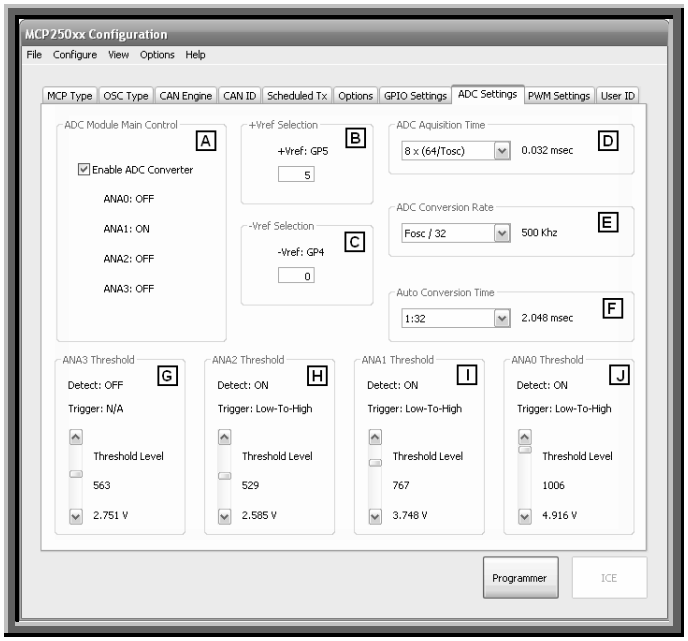
This section allows the user to set the default I/O state when the GPIO pin is configured as Digital Output

E: Enable Weak Pull-Ups

This setting allows the Weak-Pullups mode to be enabled for PGIO pins configured as digital input.

ADC Settings

This section allows the user to configure the ADC section of the MCP250XX parts (NB. Only the MCP25050 & MCP25055 parts contain an ADC module)



A: ADC Module Main Control

This section allows the user to configure the default mode for the ADC

B: +Vref Selection

This section allows the user to input the +Vref voltage value that will be used

C: -Vref Section

This section allows the user to input the -Vref voltage value that will be used

D: ADC Acquisition Time

This setting allows the user to select how long the ADC module spends reading a value before ADC conversion takes place

E: Auto Conversion Rate

This section allows the user to selects the speed of the ADC conversion

F: Auto Conversion Time

This setting allows the user to select the time the ADC module waits before carrying out an auto conversion

G: ANA3 Threshold

This section details how the direction and level of signal to cause a threshold detection CAN frame to be sent

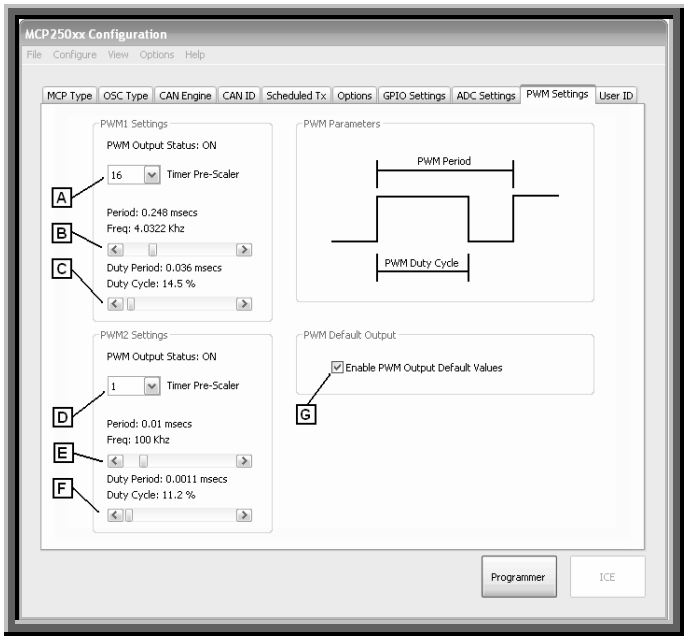
H: ANA2 Threshold
This section details how the direction and level of signal to cause a threshold detection CAN frame to be sent

I: ANA1 Threshold
This section details how the direction and level of signal to cause a threshold detection CAN frame to be sent

J: ANA0 Threshold
This section details how the direction and level of signal to cause a threshold detection CAN frame to be sent

PWM Settings

This section allows the user to set up the PWM outputs of the MCP250xx part.



A: PWM1 Timer Pre-Scaler

This setting configures the default pre-scaler value

B: Period

This setting is used to program the default PWM frequency required

C: Duty Cycle

This setting is used to program the default Duty Cycle used by the PWM generator

D: PWM1 Timer Pre-Scaler

This setting configures the default pre-scaler value

E: Period

This setting is used to program the default PWM frequency required

F: Duty Cycle

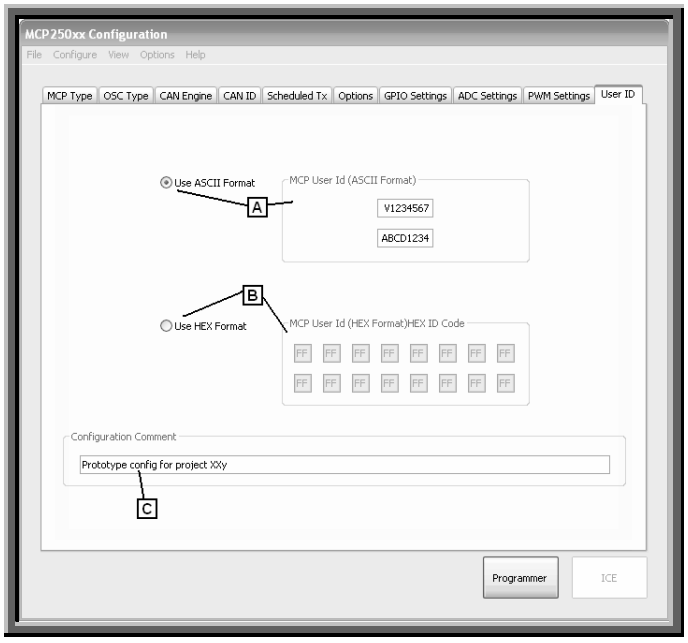
This setting is used to program the default Duty Cycle used by the PWM generator

G: Enable PWM Default Values

This enables the PWM output to revert to the programmed default PWM settings if the event of an error condition, etc

User ID

This section allows the user to set the user ID bytes of the MCP250xx. These bytes do not alter the operation of the MCP; only allow the user to include "Serial Number" and "hardware Number", etc information. These bytes can be read via CAN



A: Use ASCII Format

This setting allows the user to enter ASCII data into the user ID bytes of the MCP250xx

B: User HEX Format

This setting allows the user to enter HEX value data into the user ID bytes of the MCP250xx

C: Configuration Comment

This setting allows the user to provide a comment about this MCP250xx configuration. (E.g. / V1.2 Config. Date: 12/5/06 Project: Dash W/L Driver)